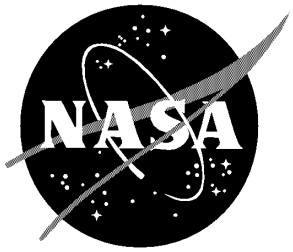

National Aeronautics and Space Administration

March 13, 1998
NRA 98-OSS-04

RESEARCH ANNOUNCEMENT

COMPARATIVE PLANETARY RESEARCH: ORIGIN AND EVOLUTION OF PLANETARY ATMOSPHERES RESEARCH AND ANALYSIS PROGRAM

Proposals Due: **May 13, 1998**

OMB Approval No. 2700-0087

COMPARATIVE PLANETARY RESEARCH: ORIGIN AND EVOLUTION OF PLANETARY ATMOSPHERES

NASA Research Announcement
Soliciting Proposals
for
Basic Research

Proposals Due: May 13, 1998

NRA 98-OSS-04
Issued: March 13, 1997

Office of Space Science
National Aeronautics and Space Administration
Washington, DC 20546-0001

COMPARATIVE PLANETARY RESEARCH:
ORIGIN AND EVOLUTION OF PLANETARY ATMOSPHERES

This NASA Research Announcement (NRA) is a solicitation of the Office of Space Science for basic research proposals relating to comparative study of the origin and evolution of terrestrial-planet atmospheres. The objective of this program is to stimulate research that enhances understanding of the conditions and processes that were important in the formation of the atmospheres of the terrestrial planets.

Participation in this program is open to all categories of organizations, domestic or foreign, including educational institutions, profit and nonprofit organizations, NASA Centers, and other Government agencies. Minority and disadvantaged institutions are particularly encouraged to apply to this NRA. Proposals may be submitted according to the schedule below and will be evaluated by scientific review panels.

This NASA program will be coordinated with the National Science Foundation (NSF). NASA and NSF will conduct a joint evaluation of proposals submitted in response to this NRA and a counterpart NSF Dear Colleague letter to ensure that the research is integrated across the Agencies and to preclude unnecessary duplication of efforts.

Further details relevant to this program are included in the Appendices to this Announcement. The complete text of the NRA and its appendices are available through the World Wide Web in several common formats under the selection "Research Opportunities" on the homepage of the NASA Office of Space Science (OSS) at the URL address <http://www.hq.nasa.gov/office/oss/>.

Appendix A provides programmatic information about the Origin and Evolution of Planetary Atmospheres program. Appendices B and C contain general and specific instructions for preparation of solicited proposals in response to this NRA. Appendix D contains standard forms that must be completed and submitted with the proposal.

Financial support is offered only to investigators from U.S. institutions. Approximately $2.0 M is expected to be available over 3 years to fund 10 to 15 awards, selected from submitted proposals, with half of this amount contributed by each Agency. Proposals from institutions outside the United States will also be considered, but only on a no exchange of funds basis as described in Section 3 of Appendix C.

Although proposals for awards up to 3 years in duration will be accepted under this NRA, the amount of funding for future years has not been established definitively at the present time. The Government's obligation to make awards is contingent upon the availability of appropriated funds from which payment for award purposes can be made and the receipt of proposals that the Government determines are acceptable for award under this NRA.

Identifier:	NRA 98-OSS-04
Submit proposal to:	Comparative Atmospheres Review Panel Lunar and Planetary Instutute 3600 Bay Area Boulevard Houston, TX 77058
Contact for commercial delivery:	Ms. Mary Cloud Telephone: (281) 486-2143
Proposal due date:	May 13, 1998
Proposal copies required:	1 signed original and 19 copies, plus 2 additional copies each of the Cover Page and Abstract (in the specified formats)
Selecting Official:	Director Research Program Management Division Office of Space Science
Obtain additional information from:	Dr. Jay T. Bergstralh Discipline Scientist, Planetary Atmospheres Research Program Managment Division Code SR Office of Space Science NASA Headquarters Washington, DC 20546-0001 E-mail: Jay.Bergstralh@hq.nasa.gov Telephone: (202) 358-0313

Obtain information on the corresponding NSF program from:

Dr. Vernon Pankonin
Program Director,
Planetary Astronomy
Division of Astronomical Sciences
National Science Foundation
4201 Wilson Boulevard
Arlington, VA 22230
E-mail: vpankoni@nsf.gov
Telephone: (703) 306-1826

NASA appreciates your interest and cooperation in the Origin and Evolution of Terrestrial-Planet Atmospheres Program.

Carl B. Pilcher
Acting Science Program Director
Solar System Exploration

List of Appendices

Appendix A - Program Description

Appendix B - Instructions for Responding to NASA Research Announcements for Solicited Basic Research Proposals

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- Yearly Budget
- Current and Pending Federal Research Support
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Program Description

COMPARATIVE PLANETARY RESEARCH: ORIGIN AND EVOLUTION OF PLANETARY ATMOSPHERES

1. Objectives of the Program

Within the past few years, extraordinary developments have made it evident that comparative planetary studies are now particularly appropriate. The stunning announcement in August 1996 of the discovery that a meteorite from Mars contains evidence suggestive of early life on that planet has raised great interest in new studies of the origin of the Martian atmosphere and of past climates on Mars. Shortly thereafter, NSF created a new program to study Life in Extreme Environments (LExEn), with the following planetary science objectives: (1) to characterize the environments of planets in the Solar System; (2) to understand the commonalities of their formation and evolution; and, thereby, (3) to enhance our understanding of the evolution of Earth and its environment. The NASA science themes Astronomical Search for Origins and Solar System Exploration have somewhat similar objectives. Similarly impressive has been the astonishingly rapid pace of recent discoveries of extrasolar planetary systems. Beginning with the first announcements in late 1995, about 15 extrasolar planetary systems have now been found. Although planets similar to Earth have not yet been identified in other planetary systems, the discovery and imaging of Earth-like planets is a major objective of the interagency "Origins" research activities. The focus on comparative planetary research through the present competition is a cooperative interagency "subset" of the larger agency-specific Origins and LExEn initiatives.

NASA and NSF share the primary Federal responsibility for support of research in astronomy and planetary science, and the two agencies have previously supported highly successful joint initiatives in these areas. Among other purposes, this coordinated Federal support for planetary science is intended to help encourage the complementary space- and ground-based observations, theory, and modeling necessary to improve our understanding of the processes that formed and that continue to affect the atmospheres and magnetospheres of the planets in our Solar System. Global greenhouse effects, global circulation patterns, effects caused by energetic particle precipitation, space-weather coupling, and the origin and evolution of planetary atmospheres are just a few examples of such processes.

For these reasons, NASA's Office of Space Science, in coordination with the Divisions of Astronomical Sciences and Atmospheric Sciences of NSF, is now prepared to accept proposals for research on the comparative aspects of the atmospheres and magnetospheres of the planets and satellites in the Solar System. Within this framework, the two Agencies anticipate maintaining coordinated support for a series of targeted competitions at least for each of the next three years (1998, 1999, and 2000), depending

upon the availability of funding, with a different focus in each year. The focus for 1998 is described below, while those for 1999 and 2000 remain to be determined. The intent of these targeted competitions is to focus the attention of the research community on these areas of investigation in order to advance our understanding of the common processes that affect planetary atmospheres and magnetospheres. Another objective is to foster cooperative investigations among the interdisciplinary communities of planetary scientists and atmospheric scientists. Studies of the similarities and differences of the variety of planetary environments in the Solar System are expected to further an understanding of the fundamental physical processes that shape those environments. This in turn will deepen our understanding of the processes that have affected and continue to affect Earth's environment. Such understanding is expected to be crucial to understanding the development of Earth and the origin and evolution of life on Earth, as well as being integral to investigations of change in the global geospace environment.

The 1998 competition is targeted to proposals for research on the comparative aspects of the atmospheres of the terrestrial planets and satellites in the solar system, with a focus on the **Origin and Evolution of the Atmosphere of Mars**. This focus on Mars in the current competition is intended to capitalize on the research activity triggered by the Antarctic Martian meteorite discoveries announced in 1996 and on the wealth of new information that is anticipated from the Mars Pathfinder lander/rover and the Mars Global Surveyor orbital mapping mission. For the targeted competition in 1998, the two Agencies together anticipate making a combined total of 10 to 15 awards, totaling approximately $2 million over three years.

Research problems appropriate for the 1998 competition might include:

- The "early faint Sun" problem. For example, what are the implications of the early, faint Sun for the origin and evolution of the Martian and terrestrial paleoatmospheres? How was it possible for liquid water to exist on early Mars? How was it possible to maintain conditions suitable for life to have originated and survived on Earth for 3.7 billion years or more? Did life on Earth or Mars play a role in maintaining the early atmosphere?

- Interactions between the solar wind and planetary atmospheres. For example: since Mars has, at most, only a weak remnant magnetic field, the solar wind acts directly on the atmosphere. Was this an important factor in the evolution of the Martian atmosphere? Did the Sun pass through a T Tauri phase that accentuated interactions of the solar wind with planetary atmospheres and magnetospheres? What role could such enhanced interactions have played in determining the composition and structure of the present atmospheres?

- Atmospheres and life. For example: how do biological processes, as well as physical processes, affect atmospheric evolution? Were any of these

conditions or processes present early in the history of Mars? What atmospheric changes can serve as spectroscopic "signatures" of the presence of living organisms?

Proposals in response to this NRA may cover any one or a combination of observations, laboratory, theory, and modeling related to the targeted research focus described above. For all proposals, the comparative nature of the research project should be particularly emphasized. Collaborative projects among researchers in the different disciplines are encouraged but are not required. Investigations of one, two, or three years duration will be considered. Proposers are reminded that education and public outreach are now ongoing priorities with NASA; see Section 4 of Appendix C for guidance in preparation of a request for support of education and public outreach (E/PO) activities that are in association with the research project on which the proposal is based. Please note that proposals for research relevant to other aspects of planetary science should be submitted to the regular planetary science programs at NSF or NASA, as appropriate.

In the spirit of interagency cooperation and reduction of paper work, NSF and NASA will carry out a joint proposal review using a single sitting panel of experts. The panel will evaluate the factors described in Section I of Appendix B (as modified by section 5 of Appendix C) of this NRA for selection of NASA research proposals. The primary criterion on which the proposals will be judged is intellectual merit - How important is the proposed activity to advancing knowledge and understanding within its own field and across different fields? How well qualified is the proposer (individual or team) to conduct the project? To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources? NSF and NASA will consider the panel's evaluation of the proposals in making their funding decisions. Successful proposals will by funded by either NSF or NASA, at the Agencies' discretion.

INSTRUCTIONS FOR RESPONDING TO NASA RESEARCH ANNOUNCEMENTS

Part 1852.235-72
NASA Federal Acquisition Regulations (FAR) Supplement (NFS)
Version 89.90, Effective March 11, 1997.

Accessible at URL
<http://www.hq.nasa.gov/office/procurement/regs/nfstoc.htm>,
open Part 1852.228 to 1852.241 from menu.

(JANUARY 1997)

A. General.

(1) Proposals received in response to a NASA Research Announcement (NRA) will be used only for evaluation purposes. NASA does not allow a proposal, the contents of which are not available without restriction from another source, or any unique ideas submitted in response to an NRA to be used as the basis of a solicitation or in negotiation with other organizations, nor is a preaward synopsis published for individual proposals.

(2) A solicited proposal that results in a NASA award becomes part of the record of that transaction and may be available to the public on specific request; however, information or material that NASA and the awardee mutually agree to be of a privileged nature will be held in confidence to the extent permitted by law, including the Freedom of Information Act.

(3) NRA's contain programmatic information and certain requirements which apply only to proposals prepared in response to that particular announcement. These instructions contain the general proposal preparation information which applies to responses to all NRA's.

(4) A contract, grant, cooperative agreement, or other agreement may be used to accomplish an effort funded in response to an NRA. NASA will determine the appropriate instrument. Contracts resulting from NRA's are subject to the Federal Acquisition Regulation (FAR) and the NASA FAR Supplement (NFS). Any resultant grants or cooperative agreements will be awarded and administered in accordance with the NASA Grant and Cooperative Agreement Handbook (NPG 5800.1).

(5) NASA does not have mandatory forms or formats for responses to NRA's; however, it is requested that proposals conform to the guidelines in these instructions.

NASA may accept proposals without discussion; hence, proposals should initially be as complete as possible and be submitted on the proposers' most favorable terms.

(6) To be considered for award, a submission must, at a minimum, present a specific project within the areas delineated by the NRA; contain sufficient technical and cost information to permit a meaningful evaluation; be signed by an official authorized to legally bind the submitting organization; not merely offer to perform standard services or to just provide computer facilities or services; and not significantly duplicate a more specific current or pending NASA solicitation.

B. NRA-Specific Items. Several proposal submission items appear in the NRA itself: the unique NRA identifier, when to submit proposals, where to send proposals, number of copies required, and sources for more information. Items included in these instructions may be supplemented by the NRA.

C. Proposal Content. The following information is needed to permit consideration in an objective manner. NRA's will generally specify topics for which additional information or greater detail is desirable. Each proposal copy shall contain all submitted material, including a copy of the transmittal letter if it contains substantive information.

(1) *Transmittal Letter or Prefatory Material.*

(i) The legal name and address of the organization and specific division or campus identification, if part of a larger organization;

(ii) A brief, scientifically valid project title intelligible to a scientifically literate reader and suitable for use in the public press;

(iii) Type of organization: e.g., profit, nonprofit, educational, small business, minority, women-owned, etc.;

(iv) Name and telephone number of the principal investigator and business personnel who may be contacted during evaluation or negotiation;

(v) Identification of other organizations that are currently evaluating a proposal for the same efforts;

(vi) Identification of the NRA, by number and title, to which the proposal is responding;

(vii) Dollar amount requested, desired starting date, and duration of project;

(viii) Date of submission; and

(ix) Signature of a responsible official or authorized representative of the organization, or any other person authorized to legally bind the organization(unless the signature appears on the proposal itself).

(2) *Restriction on Use and Disclosure of Proposal Information*. Information contained in proposals is used for evaluation purposes only. Offerors or quoters should, in order to maximize protection of trade secrets or other information that is confidential or privileged, place the following Notice on the title page of the proposal and specify the information subject to the notice by inserting an appropriate identification in the Notice. In any event, information contained in proposals will be protected to the extent permitted by law, but NASA assumes no liability for use and disclosure of information not made subject to the Notice.

Notice

Restriction on Use and Disclosure of Proposal Information

The information (data) contained in [insert page numbers or other identification] of this proposal constitutes a trade secret and/or information that is commercial or financial and confidential or privileged. It is furnished to the Government in confidence with the understanding that it will not, without permission of the offeror, be used or disclosed other than for evaluation purposes; provided, however, that in the event a contract(or other agreement) is awarded on the basis of this proposal, the Government shall have the right to use and disclose this information (data) to the extent provided in the contract(or other agreement). This restriction does not limit the Government's right to use or disclose this information (data) if obtained from another source without restriction.

(3) *Abstract.* Include a concise (200-300 word if not otherwise specified in the NRA) abstract describing the objective and the method of approach.

(4) *Project Description*.

(i) The main body of the proposal shall be a detailed statement of the work to be undertaken and should include objectives and expected significance, relation to the present state of knowledge, and relation to previous work done on the project and to related work in progress elsewhere. The statement should outline the plan of work, including the broad design of experiments to be undertaken and a description of experimental methods and procedures. The project description should address the evaluation factors in these instructions and any specific factors in the NRA. Any substantial collaboration with individuals not referred to in the budget or use of consultants should be described. Subcontracting significant portions of a research project is discouraged.

(ii) When it is expected that the effort will require more than one year, the proposal should cover the complete project to the extent that it can be reasonably anticipated. Principal emphasis should be on the first year of work, and the description should distinguish clearly between the first year's work and work planned for subsequent years.

(5) *Management Approach.* For large or complex efforts involving interactions among numerous individuals or other organizations, plans for distribution of responsibilities and arrangements for ensuring a coordinated effort should be described.

(6) *Personnel.* The principal investigator is responsible for supervision of the work and participates in the conduct of the research regardless of whether or not compensated under the award. A short biographical sketch of the principal investigator, a list of principal publications, and any exceptional qualifications should be included. Omit social security number and other personal items which do not merit consideration in evaluation of the proposal. Give similar biographical information on other senior professional personnel who will be directly associated with the project. Give the names and titles of any other scientists and technical personnel associated substantially with the project in an advisory capacity. Universities should list the approximate number of students or other assistants, together with information as to their level of academic attainment. Any special industry-university cooperative arrangements should be described.

(7) *Facilities and Equipment.*

(i) Describe available facilities and major items of equipment especially adapted or suited to the proposed project, and any additional major equipment that will be required. Identify any Government-owned facilities, industrial plant equipment, or special tooling that are proposed for use. Include evidence of its availability and the cognizant Government points of contact.

(ii) Before requesting a major item of capital equipment, the proposer should determine if sharing or loan of equipment already within the organization is a feasible alternative. Where such arrangements cannot be made, the proposal should so state. The need for items that typically can be used for research and non research purposes should be explained.

(8) *Proposed Costs*.

(i) Proposals should contain cost and technical parts in one volume: do not use separate "confidential" salary pages. As applicable, include separate cost estimates for salaries and wages, fringe benefits, equipment, expendable materials and supplies, services, domestic and foreign travel, ADP expenses, publication or page charges, consultants, subcontracts, other miscellaneous identifiable direct

costs, and indirect costs. List salaries and wages in appropriate organizational categories (e.g., principal investigator, other scientific and engineering professionals, graduate students, research assistants, and technicians and other non-professional personnel). Estimate all staffing data in terms of staff-months or fractions of full-time.

(ii) Explanatory notes should accompany the cost proposal to provide identification and estimated cost of major capital equipment items to be acquired, purpose and estimated number and lengths of trips planned, basis for indirect cost computation(including date of most recent negotiation and cognizant agency), and clarification of other items in the cost proposal that are not self-evident. List estimated expenses as yearly requirements by major work phases.

(iii) Allowable costs are governed by FAR Part 31 and the NASA FAR Supplement Part 1831(and OMB Circulars A-21 for educational institutions and A-122 for nonprofit organizations).

(9) *Security*. Proposals should not contain security classified material. If the research requires access to or may generate security classified information, the submitter will be required to comply with Government security regulations.

(10) *Current Support*. For other current projects being conducted by the principal investigator, provide title of project, sponsoring agency, and ending date.

(11) *Special Matters*.

(i) Include any required statements of environmental impact of the research, human subject or animal care provisions, conflict of interest, or on such other topics as may be required by the nature of the effort and current statutes, executive orders, or other current Government-wide guidelines.
(ii) Proposers should include a brief description of the organization, its facilities, and previous work experience in the field of the proposal. Identify the cognizant Government audit agency, inspection agency, and administrative contracting officer, when applicable.

D. Renewal Proposals

(1) Renewal proposals for existing awards will be considered in the same manner as proposals for new endeavors. A renewal proposal should not repeat all of the information that was in the original proposal. The renewal proposal should refer to its predecessor, update the parts that are no longer current, and indicate what elements of the research are expected to be covered during the period for which support is desired. A description of any significant findings since the most recent progress report should be included. The renewal proposal should treat, in reasonable

detail, the plans for the next period, contain a cost estimate, and otherwise adhere to these instructions.

(2) NASA may renew an effort either through amendment of an existing contract or by a new award.

E. Length. Unless otherwise specified in the NRA, effort should be made to keep proposals as brief as possible, concentrating on substantive material. Few proposals need exceed 15-20 pages. Necessary detailed information, such as reprints, should be included as attachments. A complete set of attachments is necessary for each copy of the proposal. As proposals are not returned, avoid use of "one-of-a-kind" attachments.

F. Joint Proposals.

(1) Where multiple organizations are involved, the proposal may be submitted by only one of them. It should clearly describe the role to be played by the other organizations and indicate the legal and managerial arrangements contemplated. In other instances, simultaneous submission of related proposals from each organization might be appropriate, in which case parallel awards would be made.

(2) Where a project of a cooperative nature with NASA is contemplated, describe the contributions expected from any participating NASA investigator and agency facilities or equipment which may be required. The proposal must be confined only to that which the proposing organization can commit itself. "Joint" proposals which specify the internal arrangements NASA will actually make are not acceptable as a means of establishing an agency commitment.

G. Late Proposals. A proposal or modification received after the date or dates specified in an NRA may be considered if doing so is in the best interests of the Government.

H. Withdrawal. Proposals may be withdrawn by the proposer at any time before award. Offerors are requested to notify NASA if the proposal is funded by another organization or of other changed circumstances which dictate termination of evaluation.

I. Evaluation Factors

(1) Unless otherwise specified in the NRA, the principal elements (of approximately equal weight) considered in evaluating a proposal are its relevance to NASA's objectives, intrinsic merit, and cost.

(2) Evaluation of a proposal's relevance to NASA's objectives includes the consideration of the potential contribution of the effort to NASA's mission.

(3) Evaluation of its intrinsic merit includes the consideration of the following factors of equal importance:

(i) Overall scientific or technical merit of the proposal or unique and innovative methods, approaches, or concepts demonstrated by the proposal.

(ii) Offeror's capabilities, related experience, facilities, techniques, or unique combinations of these which are integral factors for achieving the proposal objectives.

(iii) The qualifications, capabilities, and experience of the proposed principal investigator, team leader, or key personnel critical in achieving the proposal objectives.

(iv) Overall standing among similar proposals and/or evaluation against the state-of-the-art.

(4) Evaluation of the cost of a proposed effort may include the realism and reasonableness of the proposed cost and available funds.

J. Evaluation Techniques. Selection decisions will be made following peer and/or scientific review of the proposals. Several evaluation techniques are regularly used within NASA. In all cases, proposals are subject to scientific review by discipline specialists in the area of the proposal. Some proposals are reviewed entirely in-house, others are evaluated by a combination of in-house and selected external reviewers, while yet others are subject to the full external peer review technique (with due regard for conflict-of-interest and protection of proposal information), such as by mail or through assembled panels. The final decisions are made by a NASA selecting official. A proposal which is scientifically and programmatically meritorious, but not selected for award during its initial review, may be included in subsequent reviews unless the proposer requests otherwise.

K. Selection for Award.

(1) When a proposal is not selected for award, the proposer will be notified. NASA will explain generally why the proposal was not selected. Proposers desiring additional information may contact the selecting official who will arrange a debriefing.

(2) When a proposal is selected for award, negotiation and award will be handled by the procurement office in the funding installation. The proposal is used as the basis for negotiation. The contracting officer may request certain business data and may forward a model award instrument and other information pertinent to negotiation.

L. Cancellation of NRA. NASA reserves the right to make no awards under this NRA and to cancel this NRA. NASA assumes no liability for canceling the NRA or for anyone's failure to receive actual notice of cancellation.

(End of provision)

Additional Guidelines For The Preparation Of Proposals In Response To NASA Research Announcement NRA 98-OSS-04

The information contained in Appendix C augments and supersedes Appendix B and is applicable only to this NRA. Proposers responding to this NRA should note the following features for proposal submission:

1. Proposers are requested to prepare a single proposal, including the following material:
   - Completed NSF (their Proposal Guide) and NASA (this NRA) cover sheets (*i.e.* for both Agencies)
   - Completed NSF Budget Form 1030 and NASA Budget Forms (the latter included in this NRA)
   - Completed other forms required by and found in NSF's Grant Proposal Guide (NSF-95-27) and in this NASA Research Announcement.
2. NSF will not consider for funding proposals submitted by institutions that are not traditionally supported by NSF. Such proposals may be submitted for funding by NASA and, therefore, need not include NSF forms.
3. A Principal Investigator (PI) may submit only one proposal to this competition, although he or she may be a Co-Investigator on other proposals.

1. Proposal Format and Content

Each proposal should include, in the order listed, the following parts:

1. Cover Page (form provided in Appendix D of this NRA and NSF Guide). Note that the Cover Page requires signatures of the PI and the Institutional Authorizing Official.
2. Proposal Summary of the proposed scientific investigation (form provided in Appendix D of this NRA). NASA plans to publish the proposal titles, names of Principal Investigators with institutions, and summaries of all selected investigations, in a publicly accessible data base. Therefore, the submitted Proposal Summary should be very clearly written in the specified form and should not contain any proprietary information that would preclude its release without restriction.
3. Table of Contents (brief, 1 page maximum).
4. Science Plan. A detailed description of the proposed science program, including objectives, mission data to be used, work plan, schedule, expected results, and references to the literature. This section should provide sufficient detail to enable a reviewer to judge the scientific merit and feasibility of the proposed research in

relation to the objectives and scope of the Cooperative Planetary Research Program described in Appendix A.

5. Management Plan. Describes the role of the PI and each Co-I, and any other significant personnel in the accomplishment of the proposed work. If multiple institutions are involved, the institutional responsibilities and/or other terms of agreement necessary for achieving the objectives of the program should be specified.
6. Education/Public Outreach Plan (optional; see Section 4, below, in this Appendix)
7. Budget Plan. The budget plan must contain the Summary Budget and Yearly Budget on forms supplied in Appendix D of this NRA, plus additional pages providing all the budget details and justifications requested in the "Instructions for Budget Summary" in Appendix D. The Budget Plan should clearly demonstrate to reviewers and to NASA the reasonableness of each cost item and its relevance to the purposes of the proposal, and of the Cooperative Planetary Research Program.
8. Current and Pending Federal Research Support (Form provided in Appendix D of this NRA).
9. Curriculum Vitae A brief curriculum vita, along with a list of relevant scientific publications covering the past five years, should be included. The curriculum vita and publications list should not exceed one page for the PI and each Co-I.
10. Certification Forms (note: the Certification forms need only be included in the signed original proposal; see Appendix D)
11. Institutional budget forms (preference and format of submitting institution(s)).

2. Page Limit

Proposals should be concisely written in order to minimize the burden on the reviewers and to facilitate the overall review process. Printing on both sides of the paper is desirable, but not required. Each side of a sheet of paper containing text or illustrations is considered a page. The combined Science Plan and Management Plan must be in at least 10-point or larger type and together should not exceed 15 pages in length. Do not enclose reprints or preprints or any form of electronic media. To facilitate recycling the paper in the proposals after review, proposals should be submitted on plain white paper only. This precludes the use of cardboard stock, plastic covers, colored paper, etc.

3. Guidelines for Foreign Participation

NASA welcomes proposals from outside the U.S. However, investigators working outside the U.S. are not eligible for funding from NASA. Proposals from non-U.S. entities should not include a cost plan. Proposals from outside the U.S. and U.S. proposals that include non-U.S. participation must be endorsed by the respective

government agency or funding/sponsoring institution in that country from which the non-U.S. participant is proposing. Such endorsement should indicate that the proposal merits careful consideration by NASA, and if the proposal is selected, sufficient funds will be made available to undertake the activity as proposed.

In addition to sending the requested number of copies of the proposal to the designated address, one copy of the proposal, along with the Letter of Endorsement from the sponsoring non-U.S. agency must be forwarded to:

Bettye Jones
(NRA 98-OSS-04)
Space Science and Aeronautics Division
Code IS
NASA Headquarters
Washington, DC 20546-0001
USA

All proposals must be typewritten in English. All non-U.S. proposals will undergo the same evaluation and selection process as those originating in the U.S. All proposals must be received before the established closing date; those received after the closing date will be treated in accordance with NASA's provisions for late proposals. Sponsoring non-U.S. agencies may, in exceptional situations, forward a proposal without endorsement to the above address if endorsement is not possible before the announced closing date. In such cases, however, NASA's Space Science and Aeronautics Division should be advised when a decision on endorsement can be expected.

Successful and unsuccessful proposers will be contacted directly by the NASA Research Program Management Division. Copies of these letters will be sent to the sponsoring government agency. Should a non-U.S. proposal or a U.S. proposal with non-U.S. participation be selected, NASA's Space Science and Aeronautics Division will arrange with the non-U.S. sponsoring agency for the proposed participation on a no-exchange-of-funds basis, in which NASA and the non-U.S. sponsoring agency will each bear the cost of discharging their respective responsibilities. Depending on the nature and extent of the proposed cooperation, these arrangements may entail:

1. A letter of notification by NASA, and
2. An exchange of letters between NASA and the sponsoring governmental agency; or
3. A formal Agency-to-Agency Memorandum of Understanding (MOU).

4. Education/Public Outreach (E/PO) Proposals

The Office of Space Science (OSS) has developed a comprehensive approach for making education at all levels (with a particular emphasis on precollege education) and the enhancement of public understanding of space science integral parts of all of its missions and research programs. The two key documents that establish the basic policies and guide all OSS Education and Outreach activities are a strategic plan entitled *Partners in Education: A Strategy for Integrating Education and Public Outreach Into NASA's Space Science Programs* (March 1995), and an accompanying implementation plan entitled *Implementing the Office of Space Science (OSS) Education/Public Outreach Strategy* (1996). Both are available and can be accessed on the World Wide Web by selecting "Education and Outreach" from the menu on the OSS homepage at <http://www.hq.nasa.gov/office/oss/>, or from Dr. Jeffrey Rosendhal, Office of Space Science, Code S, NASA Headquarters, Washington, DC 20546-0001, USA.

In accord with these established OSS policies, proposers to this NRA are strongly encouraged to include an Education/Public Outreach (E/PO) component as part of their scientific research proposal. Note that E/PO activities may be funded only in conjunction with a "parent" research proposal. Up to $10K per year may be proposed for an E/PO program, although larger budgets will be considered based on the demonstrated merits of the proposed E/PO activity.

Every E/PO component of a research proposal will be evaluated by appropriate scientific, education, and communications (i.e., 'outreach') personnel (see criteria below), and the results of these reviews will be transmitted to the cognizant Discipline Scientist in time for use in the selection process. The OSS Selecting Official will specifically take into account the presence of a proposed E/PO component and its review rating when deciding on final selections and funding levels. Results of these E/PO reviews can be used to aid in discriminating between research proposals having otherwise comparable science, technical, and programmatic merits. As many E/PO proposals of merit as possible will be funded within the current yearly budget of about $1.5M that is available for their support through all Fiscal Year 1998 OSS NRA's. Regardless of whether the "parent" research proposal is selected or not, the review of each E/PO proposal will be conveyed to the proposer as part of their debriefing.

The broad evaluation criteria against which a proposed E/PO activity will be judged are:

- The effectiveness and realism of the proposed E/PO program;
- The establishment of effective, long-duration partnerships with institutions and/or personnel in the fields of educational and/or public outreach as the basis for and an integral element of the proposed E/PO program;
- The prospects for the proposed E/PO program to have a "multiplier effect" reaching audiences well beyond those directly targeted by the proposed

activity (e.g., prospects for the broad dissemination of a planned E/PO product);

- Where relevant, the degree to which the proposed E/PO program benefits and promotes nationally recognized and endorsed efforts in education reform and ongoing reform efforts being carried out at the state, district, or local levels;
- The degree to which the proposed E/PO effort contributes to the training of, involvement in, and broad understanding of science and technology by underserved/underutilized groups;
- The prospects for building on, taking advantage of, and leveraging existing and/or ancillary resources beyond those directly requested in the proposal;
- The plans for evaluating the effectiveness and impact of the proposed education/outreach activity;
- The capability, commitment, and experience of the proposer to carry out the proposed E/PO program; and
- The adequacy and realism of the proposed budget (including any additional resources outside those requested from NASA).

Note that originality of the proposed effort is not a criterion; rather NASA OSS seeks assurance that an effective and appropriate E/PO activity has been planned and will be executed, although general adherence to the principles outlined in the OSS implementation plan will be explicitly considered in arriving at funding decisions.

SPECIAL NOTE: To directly aid space science research personnel in identifying suitable education and/or outreach opportunities and to help develop partnerships between the space science and education/outreach communities, NASA OSS initiated in 1997 an "Education and Outreach Broker/Facilitator Program" (see NRA 97-OSS-07). The goal of this program is to search out and establish high leverage opportunities, arrange alliances between educators and OSS-supported scientists, help scientists turn results from space science missions and programs into educationally appropriate products and/or services, and arrange for the results from such education and outreach activities to be disseminated regionally and/or nationally. Further information about this program, a list of the selected OSS Broker/Facilitators, and information on the services to be provided to the space science community by the Broker/Facilitators may also be accessed through the OSS homepage as described above. Note that the four theme-oriented Education Forums listed on the OSS homepage also serve as Broker/Facilitators and may be consulted for assistance as well. Prospective proposers are strongly encouraged to make use of these resources to help identify suitable E/PO opportunities and arrange appropriate alliances.

The guidelines for the preparation and submission of the E/PO component of a research proposal submitted in response to any program element in this NRA are as follows:

- The body of an E/PO proposal should be restricted to five pages or less, and begin with a brief summary of the proposed program followed by a description of its objectives and plan of activity. It should discuss the intended involvement of the Principal Investigator of the "parent" research proposal, as well as that of any

additional personnel who would be responsible for the E/PO effort and/or the respective institutional responsibilities if a partnership is proposed.

- The budget for the E/PO component should use the same *Budget Summary* form in Appendix C augmented by appropriate material (1-2 pages) to provide an understanding of the details of its anticipated costs. The total for any E/PO effort must also be included in the *Budget Summary* for its "parent" research proposal. The period of performance of any proposed E/PO activity may not exceed that of its "parent" research proposal.
- The E/PO proposal should be bound as part of the total proposal in the order specified in Appendix C.1.
- The *Cover Page* submission (see also Appendix D) must indicate that an E/PO proposal is included as part of the proposal.

Questions about the E/PO submission for any of the program elements in this NRA may be directed to:

Dr. J. David Bohlin
Research Program Management Division
Code SR
Office of Space Science
NASA Headquarters
Washington DC 20546-0001
Telephone: (202)358-0880
E-mail: david.bohlin@hq.nasa.gov

Finally, attention is also called to the Initiative to Develop Education through Astronomy and Space Science (IDEAS) program administered by the Space Telescope Science Institute (STScI) on behalf of OSS. This program, which currently selects proposals yearly, provides awards of up to $10K (with a few up to $40K) to enhance and encourage the participation of space scientists in E/PO activities. Annual solicitations for the IDEAS program have typically been released in July with proposals due in October. The IDEAS program is open to any space scientist based in the U.S. regardless of whether or not they hold a research grant from NASA OSS. E-mail inquiries about IDEAS may be directed to <IDEAS@stsci.edu>. The current request for proposals is posted on the World Wide Web at <http://oposite.stsci.edu/pubinfo/edugroup/ideas.html>. Inquiries by surface mail may be addressed to

IDEAS Program, OPO
Space Telescope Science Institute
3700 San Martin Drive
Baltimore, MD 21218.

5. Evaluation, Selection, Notification, and Award Implementation

The evaluation criteria shall be as in Appendix B, Section I, with the explicit understanding that "NASA's objectives" referred to in Appendix B are the objectives of this NRA as stated in Appendix A. Proposals will be evaluated principally for intellectual merit by peer scientists, by mail and at a joint NASA/NSF review panel meeting. Factors that will be considered in evaluation of merit will include

- How important is the proposed activity to advancing knowledge and understanding within its own field and across different fields?
- How well qualified is the proposer (individual or team) to conduct the project?
- To what extent does the proposed activity suggest and explore creative and original concepts?
- How well conceived and organized is the proposed activity?
- Is there sufficient access to resources?

The NASA Program Scientist will use the consensus of these reviews, plus considerations of cost and relevance to program objectives, to recommend selections for NASA awards. Selections for NASA awards will be made by the Director of the Research Program Management Division of the Office of Space Science, in consultation with the discipline scientists and Science Program Director for the Solar System Exploration theme. Following selections, all proposers will be notified by postal or electronic mail of the decision on their proposal. NASA will tell proposers who to contact for further information or to arrange a debriefing if the proposer desires one. NASA may desire to select only a portion of a proposer's investigation, in which case the proposer will be given the opportunity to accept or decline such partial support.

6. Mailing List

Community members can arrange to receive automatic electronic notification of upcoming NASA Research Announcements and/or Announcements of Opportunity by registering for the Office of Space Science (OSS) electronic mailing list. Subscription can be made by selecting "Subscribe to E-mail Announcements" from the menu on the OSS Home Page on the World Wide Web at <"http://www.hq.nasa.gov/office/oss/"> and following instructions.

OFFICE OF SPACE SCIENCE
STANDARD FORMS FOR PROPOSERS RESPONDING TO NASA RESEARCH ANNOUNCEMENTS

PROPOSAL FORMS KIT

1. PROPOSAL COVER PAGE
    - This form requires PI and institutional signatures
2. ABSTRACT FORM
3. SUMMARY BUDGET FORM and instructions for breakout
4. YEARLY BUDGET FORM
5. CURRENT AND PENDING FEDERAL SUPPORT FORM
6. CERTIFICATION FOR DEBARMENT, SUSPENSION AND OTHER RESPONSIBILITIES
    - This form requires institutional signature.
7. CERTIFICATION REGARDING LOBBYING (IF > $100,000)
    - This form requires institutional signature.
8. EDUCATION/PUBLIC OUTREACH PROPOSAL COVER PAGE

OSS PROPOSAL COVER PAGE

NRA	NRA
Program:	

Principal Investigator *Title* *First Name* *Middle Name* *Last Name*		
Department		
Company/Institution		
Street Address	City/Town	
State	Zip/Postal	Country
Telephone	Fax	E-Mail Address
Principal Investigator's Signature		Date

Proposal Title

Co-Investigator(s) Name	Institution	E-mail

Institutional Endorsement

Name of Authorizing Official	
Title	
Institution	
Signature	Date

Budget Summary				
	Year 1	Year 2	Year 3	Total Funding
Amount Requested				

ABSTRACT

Principal Investigator			
Title	*First Name*	*Middle Initial*	*Last Name*
Proposal Title			

SUMMARY BUDGET

FROM: _____to _____

TITLE OF INVESTIGATION:

PRINCIPAL INVESTIGATOR / INSTITUTION:

		NASA USE ONLY	
	A	**B**	**C**
1. Direct Labor (salaries, wages, and fringe benefits)	_____	_____	_____
2. Other Direct Costs:			
a. Subcontracts	_____	_____	_____
b. Consultants	_____	_____	_____
c. Equipment	_____	_____	_____
d. Supplies	_____	_____	_____
e. Travel	_____	_____	_____
f. Other	_____	_____	_____
3. Indirect Costs	_____	_____	_____
4. Other Applicable Costs			
a. Education/Public Outreach	_____	_____	_____
b. Other	_____	_____	_____
5. Subtotal--Estimated Costs	_____	_____	_____
6. Less Proposed Cost Sharing	_____	_____	_____
7. Carryover Funds (if any)			
a. Anticipated amount	_____	_____	_____
b. Amount used to reduce budget	_____	_____	_____
8. Total Estimated Costs	_____	_____	XXXXXXXX
APPROVED BUDGET	XXXXXXX	XXXXXXX	_____

Instructions

1. Provide a separate Budget Summary sheet for each year of the proposal research.
2. Grantee estimated costs should be entered in Column A. Columns B and C are for NASA use only. Column C represents the approved grant budget.
3. Provide in attachments to the budget summary the detailed computations of estimates in each category, along with any narrative explanation required to fully explain proposed costs. ---------- ADDITIONAL INSTRUCTIONS ON FOLLOWING PAGE ----------

INSTRUCTIONS FOR BUDGET SUMMARY

1. Direct Labor (salaries, wages, and fringe benefits): Attachments should list the number and titles of personnel, amounts of time to be devoted to the grant, and rates of pay.

2. Other Direct Costs:
   a. Subcontracts: Attachments should describe the work to be subcontracted, estimated amount, recipient (if known), and the reason for subcontracting.
   b. Consultants: Identify consultants to be used, why they are necessary, the time they will spend on the project, and rates of pay (not to exceed the equivalent of the daily rate for Level IV of the Executive Schedule, exclusive of expenses and indirect costs).
   c. Equipment: List separately. Explain the need for items costing more than $5,000. Describe basis for estimated cost. General purpose equipment is not allowable as a direct cost unless specifically approved by the NASA Grant Officer. Any equipment purchase requested to be made as a direct charge under this award must include the equipment description, how it will be used in the conduct of the basic research proposed and why it cannot be purchased with indirect funds.
   d. Supplies: Provide general categories of needed supplies, the method of acquisition, and the estimated cost.
   e. Travel: Describe the purpose of the proposed travel in relation to the grant and provide the basis of estimate, including information on destination and number of travelers where known.
   f. Other: Enter the total of direct costs not covered by 2a through 2e. Attach an itemized list explaining the need for each item and the basis for the estimate.

3. Facilities and Administrative (F&A) Costs: Identify F&A cost rate(s) and base(s) as approved by the cognizant Federal agency, including the effective period of the rate. Provide the name, address, and telephone number of the Federal agency official having cognizance. If unapproved rates are used, explain why, and include the computational basis for the indirect expense pool and corresponding allocation base for each rate.

4. Other Applicable Costs: Enter total explaining the need for each item.

5. Subtotal-Estimated Costs: Enter the sum of items 1 through 4.

6. Less Proposed Cost Sharing (if any): Enter any amount proposed. If cost sharing is based on specific cost items, identify each item and amount in an attachment.

7. Carryover Funds (if any): Enter the dollar amount of any funds expected to be available for carryover from the prior budget period Identify how the funds will be used if they are not used to reduce the budget. NASA officials will decide whether to use all or part of the anticipated carryover to reduce the budget (not applicable to 2nd-year and subsequent-year budgets submitted for award of a multiple year award).

8. Total Estimated Costs: Enter the total after subtracting items 6 and 7b from item 5.

YEARLY BUDGET

FROM: _____ **to** _____

TITLE OF INVESTIGATION:

PRINCIPAL INVESTIGATOR/ INSTITUTION:

		(NASA USE ONLY)	
	A	**B**	**C**
1. Direct Labor (salaries, wages, and fringe benefits)	_____	_____	_____
2. Other Direct Costs: a. Subcontracts/grants	_____	_____	_____
b. Consultants	_____	_____	_____
c. Equipment	_____	_____	_____
d. Supplies	_____	_____	_____
e. Travel	_____	_____	_____
f. Other	_____	_____	_____
3. Indirect Costs	_____	_____	_____
4. Other Applicable Costs	_____	_____	_____
5. Subtotal--Estimated Costs	_____	_____	_____
6. Less Proposed Cost Sharing	_____	_____	_____
7. Carryover Funds (if any) a. Anticipated amount	_____	_____	_____
b. Amount used to reduce budget	_____	_____	_____
8. Total Estimated Costs	_____	_____	XXXXXXX
APPROVED BUDGET	XXXXXXXX	XXXXXXX	_____

CURRENT AND PENDING RESEARCH SUPPORT FROM ALL OTHER FEDERAL SOURCES

Include all current research support for all other sources. Also include the proposed project and all other research requiring a part of the PI's time. State the number of person months regardless of the source of the support.

Name of Principal Investigator

_____

A. Current Support

1. Source of Support _____
2. Project Title _____
3. Award Amount _____
4. Period of Award _____
5. Person-Months _____

B. Pending Proposals (including supplement applications)

1. Source of Support _____
2. Project Title _____
3. Award Amount _____
4. Period of Award _____
5. Person-Months _____

Other Agencies to which this proposal, or parts thereof, has been submitted:

_____

_____

Duplicate this page as many times as needed to provide a complete list.

Certification Regarding
Debarment, Suspension, and Other Responsibility Matters
Primary Covered Transactions

This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, 14 CFR Part 1265.

(1) The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:
   (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
   (b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statues or commission of embezzlement theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
   (c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and
   (d) Have not within three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

(2) Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

Organization Name PR/Award Number or Proposal Name

Name and Title of Authorized Representative

Signature Date

Certification Regarding Lobbying

Certification for Contracts, Grants, Loans, and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000, and not more than $100,000 for each such failure.

Organization Name PR/Award Number or Proposal Name

Name and Title of Authorized Representative

Signature Date

EDUCATION/PUBLIC OUTREACH (E/PO) PROPOSAL COVER PAGE

NRA ID:	NRA Title
Parent Research Proposal	

Principal Investigator (Title and Name)		
Department		
Company/Institution		
Street Address	City/Town	
State	Zip/Postal	Country
Telephone Address	Fax	E-Mail
Principal Investigator's Signature		Date

E/PO Proposal Title

Co-Investigator(s) Name	Institution	E-mail

Institutional Endorsement

Name of Authorizing Official	
Title	
Institution	
Signature	Date

Budget Summary				
	Year 1	Year 2	Year 3	Total Funding
Amount Requested				